

CAT4106AGEVB

CAT4106 LED Driver Evaluation Board User's Manual



ON Semiconductor®

<http://onsemi.com>

EVAL BOARD USER'S MANUAL

Introduction

This document describes the CAT4106AGEVB evaluation board for the CAT4106 quad-channel DC/DC boost LED driver. The major operating characteristics of the CAT4106 can be measured with this board.

The CAT4106 DC/DC converter is capable of driving up to 4 strings of LEDs with tight matching. This device is designed to drive LED strings up to 36 V. The LED brightness is set by a single resistor from the RSET pin to GND and PWM dimming is available via the EN/PWM pin. Additional information can be found in the CAT4106 data sheet.

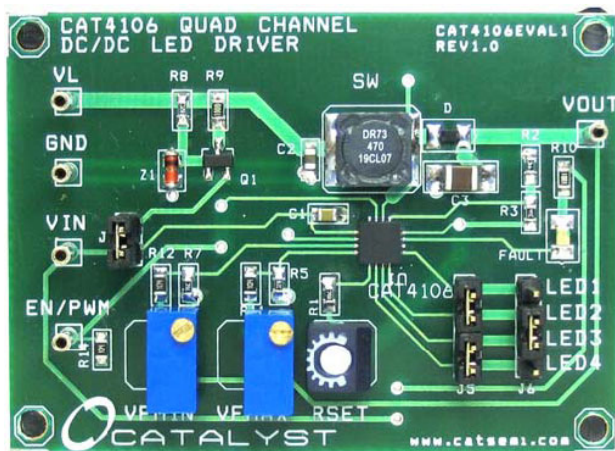


Figure 1. CAT4106AGEVB Board

Operation Procedure

The CAT4106AGEVB board contains one CAT4106 in a typical application circuit. The board can be powered in two different ways. With the J1 jumper in place a single high voltage supply (6 V to 24 V) can be applied between VL and GND. A circuit on board will generate a lower, regulated voltage for the VIN pin (6.2 V – V_{GS} of transistor M1). VIN can also be powered separately by removing the J1 jumper and applying a second voltage to the VIN test point. The voltage at VIN should not exceed 6.0 V.

V_FMAX and V_FMIN are set by potentiometers R4 and R6 respectively. The V_FMIN potentiometer is located closest to the VIN test point. These can be used to set the maximum and minimum allowable forward voltages for any given LED string. For the CAT4106AGEVB, the settings for these potentiometers are calculated as follows:

$$R4 = 69.8 \text{ k}\Omega \times \left(\frac{V_{FMAX}}{1.2 \text{ V}} - 1 \right) - 100 \text{ k}\Omega \quad (\text{eq. 1})$$

$$R6 = 60 \text{ k}\Omega \times \left(\frac{V_{FMIN}}{1.2 \text{ V}} - 1 \right) - 100 \text{ k}\Omega \quad (\text{eq. 2})$$

Any open LED conditions will trigger a fault condition. Any short LED conditions will only trigger a fault condition during power-up. A red LED will turn on when a fault condition takes place.

The LED current is set by potentiometer R13 which is labeled RSET on the CAT4106AGEVB. The anode end of each LED string should be connected to VOUT and the cathode ends can be connected at the available header connectors J5 and J6. Placing jumpers on J5 and J6 headers allows to short two or more LED channels together.

EN or PWM input signals can be connected at the EN/PWM test point. The voltage at EN/PWM should not exceed 6.0 V. The CAT4106 can support PWM frequencies up to 2 kHz.

CAT4106AGEVB

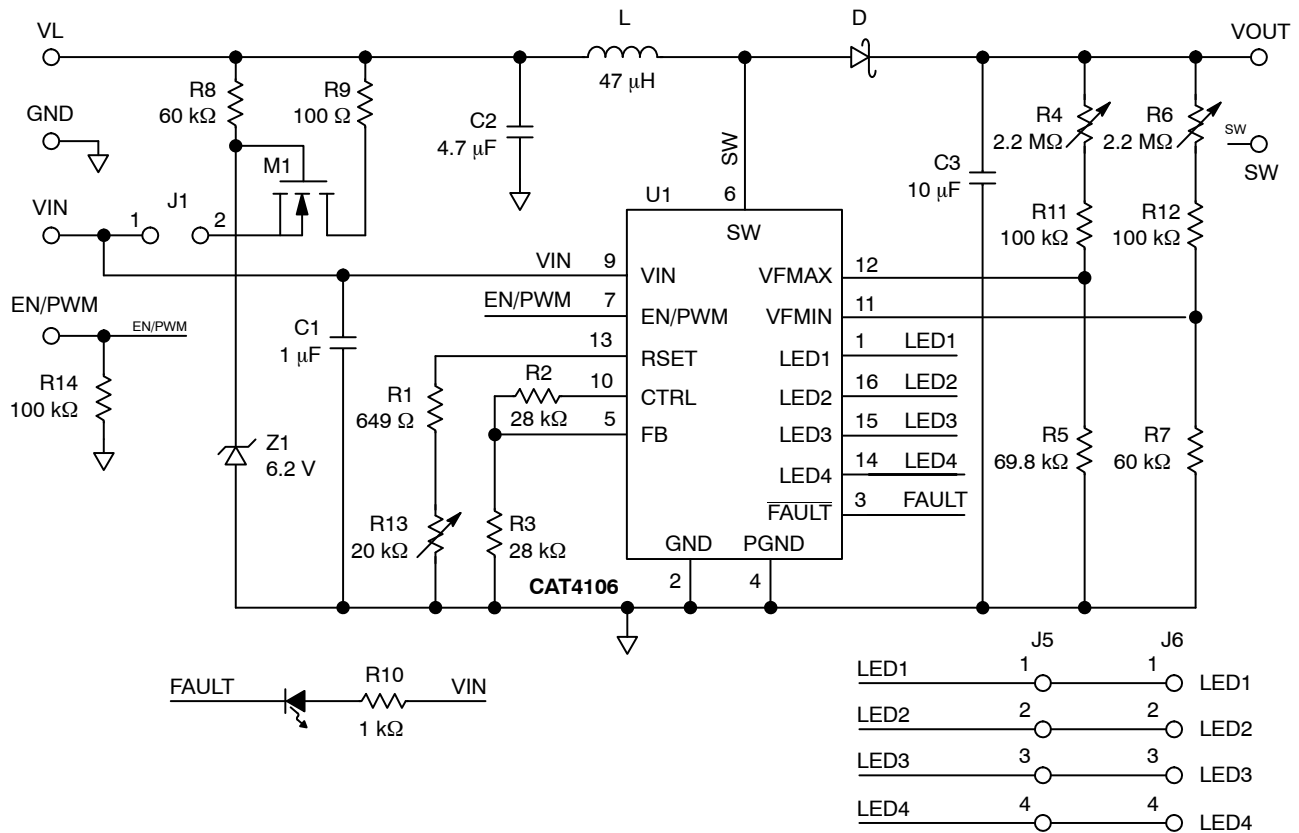


Figure 2. CAT4106AGEVB Board Schematic

Table 1. BILL OF MATERIALS

Name	Manufacturer	Description	Part Number	Units
U1	ON Semiconductor	4-Channel Boost LED Driver, 4 mm x 4 mm TQFN	CAT4106	1
C1	AVX	Ceramic Capacitor 1.0 μ F/10 V, 10%, X5R, 0603	0603ZD105KAT2A	1
C2	AVX	Ceramic Capacitor 4.7 μ F/25 V, 10%, X5R, 1206	12063D475KAT2A	1
C3	Taiyo Yuden	Ceramic Capacitor 10 μ F/ 35 V, 10%, X5R, 1210	GMK325BJ106KN-T	1
R1	Yageo	SMT Resistor 0.1 W, 649 Ω , 0603	RC0603FR-07649RL	1
R2, R3	Yageo	SMT Resistor, 0.1 W, 28 k Ω , 0603	RC0603FR-0728KL	2
R4, R6	Vishay	Trimmer Potentiometer, 2.2 M Ω	T93YB225K	2
R5	Yageo	SMT Resistor, 0.1 W, 69.8 k Ω , 0603	RC0603FR-0769K8L	1
R7, R8	Yageo	SMT Resistor, 0.1 W, 60.4 k Ω , 0603	RC0603FR-0760K4L	2
R9	Yageo	SMT Resistor, 0.1 W, 100 Ω , 0603	RC0603FR-07100RL	1
R10	Tyco	SMT Resistor, 0.1 W, 1 k Ω , 0603	RC0603FR-071KL	1
R11, R12, R14	Yageo	SMT Resistor, 0.1 W, 100 k Ω , 0603	RC0603FR-07100KL	3
R13	Vishay	Trimmer Potentiometer, 20 k Ω	T73YE-20K-ND	1
L	Coiltronics	Inductor 47 μ H, 1.08 A	DR73-470-R	1
D	NXP	Schottky Diode, 60 V/1 A	PMEG6010CEJ T/R	1
M1	ON Semiconductor	N-Channel MOSFET, 60 V/115 mA	2N7002L	1
Z1	ON Semiconductor	Zener Diode, 6.2 V	MM3Z6V2	1
J1, J2	Tyco	2 Pin Header Connector 0.1" Pitch	640452-2	2
J5, J6	Tyco	4 Pin Header Connector 0.1" Pitch	640452-4	2
	Mil-Max	Pin Receptacle (Test Points)	#0149-0-15-01-30-14-04-0 (or equiv)	6
	LiteOn	SMT Red LED	LTST-T970KRKT	1

onsemi, **onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

The evaluation board/kit (research and development board/kit) (hereinafter the "board") is not a finished product and is not available for sale to consumers. The board is only intended for research, development, demonstration and evaluation purposes and will only be used in laboratory/development areas by persons with an engineering/technical training and familiar with the risks associated with handling electrical/mechanical components, systems and subsystems. This person assumes full responsibility/liability for proper and safe handling. Any other use, resale or redistribution for any other purpose is strictly prohibited.

THE BOARD IS PROVIDED BY ONSEMI TO YOU "AS IS" AND WITHOUT ANY REPRESENTATIONS OR WARRANTIES WHATSOEVER. WITHOUT LIMITING THE FOREGOING, ONSEMI (AND ITS LICENSORS/SUPPLIERS) HEREBY DISCLAIMS ANY AND ALL REPRESENTATIONS AND WARRANTIES IN RELATION TO THE BOARD, ANY MODIFICATIONS, OR THIS AGREEMENT, WHETHER EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY AND ALL REPRESENTATIONS AND WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, TITLE, NON-INFRINGEMENT, AND THOSE ARISING FROM A COURSE OF DEALING, TRADE USAGE, TRADE CUSTOM OR TRADE PRACTICE.

onsemi reserves the right to make changes without further notice to any board.

You are responsible for determining whether the board will be suitable for your intended use or application or will achieve your intended results. Prior to using or distributing any systems that have been evaluated, designed or tested using the board, you agree to test and validate your design to confirm the functionality for your application. Any technical, applications or design information or advice, quality characterization, reliability data or other services provided by **onsemi** shall not constitute any representation or warranty by **onsemi**, and no additional obligations or liabilities shall arise from **onsemi** having provided such information or services.

onsemi products including the boards are not designed, intended, or authorized for use in life support systems, or any FDA Class 3 medical devices or medical devices with a similar or equivalent classification in a foreign jurisdiction, or any devices intended for implantation in the human body. You agree to indemnify, defend and hold harmless **onsemi**, its directors, officers, employees, representatives, agents, subsidiaries, affiliates, distributors, and assigns, against any and all liabilities, losses, costs, damages, judgments, and expenses, arising out of any claim, demand, investigation, lawsuit, regulatory action or cause of action arising out of or associated with any unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of any products and/or the board.

This evaluation board/kit does not fall within the scope of the European Union directives regarding electromagnetic compatibility, restricted substances (RoHS), recycling (WEEE), FCC, CE or UL, and may not meet the technical requirements of these or other related directives.

FCC WARNING – This evaluation board/kit is intended for use for engineering development, demonstration, or evaluation purposes only and is not considered by **onsemi** to be a finished end product fit for general consumer use. It may generate, use, or radiate radio frequency energy and has not been tested for compliance with the limits of computing devices pursuant to part 15 of FCC rules, which are designed to provide reasonable protection against radio frequency interference. Operation of this equipment may cause interference with radio communications, in which case the user shall be responsible, at its expense, to take whatever measures may be required to correct this interference.

onsemi does not convey any license under its patent rights nor the rights of others.

LIMITATIONS OF LIABILITY: **onsemi** shall not be liable for any special, consequential, incidental, indirect or punitive damages, including, but not limited to the costs of requalification, delay, loss of profits or goodwill, arising out of or in connection with the board, even if **onsemi** is advised of the possibility of such damages. In no event shall **onsemi**'s aggregate liability from any obligation arising out of or in connection with the board, under any theory of liability, exceed the purchase price paid for the board, if any.

The board is provided to you subject to the license and other terms per **onsemi**'s standard terms and conditions of sale. For more information and documentation, please visit www.onsemi.com.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales

